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with C. L. Light's complement~~

# SHORT LINE RAILWAY.

*See Map at End*

MR. LIGHT'S REPORTS UPON THE SURVEY OF THE NORTHERN  
OR QUEBEC ROUTE FOR THE SHORTEST AND MOST ADVAN-  
TAGEOUS RAILWAY LINE FROM MONTREAL TO HALIFAX  
AND ST. JOHN, N. B., RECOMMENDING

## A COMBINATION LINE

*(Combining the Quebec and Etchemin Valley  
with the Lake Megantic routes)  
for the same.*

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PRINTED BY ORDER OF THE BOARD OF TRADE AND CITIZENS'  
COMMITTEE OF QUEBEC.

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## PREFACE TO REVISED SUPPLEMENTARY REPORT.

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The Board of Trade and Citizens' Committee of Quebec have thought it expedient to publish the accompanying official report on the Short Line Railway, with the view of meeting the altered aspect of the case, as shewn forth in the recent report and maps of the Government Engineer of Dominion Railways, where he advocates the adoption of certain lines which, I did not understand, to be even *under consideration*, at the date of my first report,—(26th March.)

The lines first surveyed by Messrs. Vernon Smith and Ambrose Duffy, passed *North* of Moosehead Lake.

The line now advocated passes through the said Lake to Mattawamkeag, and in order to meet this altered view of the matter, a revised (or supplementary report) was submitted (10th May) in place of the first,—but it has not appeared, having, it is presumed, arrived too late,—hence the necessity of publishing it in this form.

It will be apparent that material differences exist in the tables of distances, as given by the Government Chief Engineer, and those given by myself; Mr. Schreiber's being invariably the shorter when the Southern lines are considered.

Mr. Schreiber commences his distances at *Montreal*, and passes directly East over the St. Lawrence,—while my calculations are taken round by *Lachine*, where the Canadian Pacific Railway Company actually mean to pass the St. Lawrence by a Bridge, and to which point they have nearly completed a double-track railway from Mile-End.

From Quebec Gate Barracks Station west to Lachine is 11 miles —which distance, *must* be retraced East to get opposite Montreal, and will thus add some twenty (20) miles to all Mr. Schreiber's Southern route figures.

The Government Chief Engineer has ignored the "Combination Line" in the arrangement of his map; this line will shorten the Quebec connections by 27 (twenty-seven) and 25 (twenty-five) miles, respectively, to St. John and Halifax; Vide pages 9 and 10, tables 14 and 17, of Mr. Schreiber's report, and appendix 6 of mine, as follows:

Montreal to St. John *via* Quebec and Hartland (table 14).... 508 miles  
" " " " Chesuncook (app. 6).... 481 "

Saving by "Combination Line" ..... 27 "

Montreal to Halifax *via* Quebec and Hartland (table 17).... 785 miles  
" " " " Chesuncook (app. 6).... 710 "

Saving by "Combination Line" ..... 25 "

In all calculations of distances East of Passadumkeag and Mattawamkeag, I have, of course, assumed that the existing lines of travel will be used for the present, as no *survey had been made* of the line, between Mattawamkeag and St. Andrew's; while Mr. Schreiber has traced on his map a direct line across the eastern part of Maine, from Mattawamkeag to St. Andrew's, through a difficult country which has *not been surveyed*, (see page 8 of his report) and has calculated three of his distances on this basis.

This road may not be constructed for many a year, and should it even be built, my knowledge of the country, acquired during (10) ten years service as Chief Engineer of the New Brunswick Government Railways, convinces me that the connection between it, and the Province of *Nova Scotia* will be through St. John, and over the existing lines of railway; the details of the several lines are accurately shewn in my appendix 1 and 6-(attached,) and will be seen to be much longer than those dotted by Mr. Schreiber in his map.

The country between Moosehead Lake and Mattawamkeag,—a distance of some 65 miles,—has also been very imperfectly surveyed, and the line which Mr. Schreiber says "takes the first place" passes over a supplementary summit 950 feet in height, between the Penobscot and Kennebec rivers, which cannot apparently, be avoided. (See Mr. Moses Burpee's report, page 40.) This summit destroys the usefulness of this part of the line as an Inter-provincial *freight* line railway, virtually lengthening it very materially, (see appendix 4 (four) of my supplementary report) and would have the inevitable effect of turning such traffic as might have passed Portland, down south over the existing "Bangor and Piscataquis" Railway, into contiguous American sea-ports.

This détour *via* Passadumkeag would lengthen the distance to the Maritime Provinces some 34 miles. On page 6 of his report, Mr. Schreiber says "the line" "to Halifax *via* Moosehead, Mattawamkeag, Hervey, Fredericton and Salisbury (line No. 6) takes the first place, being one mile shorter than *via* north of Moosehead Lake, Canterbury, Fredericton and Salisbury." The only line surveyed north of Moosehead Lake was that examined by Messrs. Vernon Smith and Ambrose Duffy, who found excellent lines. (See Mr. Smith's report, ending page 52, and Mr. Duffy's, ending page 26.)

In my supplementary report it has been shewn that the line from Montreal to Halifax *via* Quebec and Chesuncook, is 10 miles shorter

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than the line between the same points *via* Megantic and Chesuncook. (See appendix 6, tables 5 and 6.) It is therefore ~~six~~ miles shorter than Mr. Schreiber's line "No. 6" (page 6 of his report.) When the data afforded by the imperfect surveys between Moosehead and Mattawamkeag are discounted, added to the further fact that 113 miles on line No. 6, are *not surveyed at all*, the above will be considered a close calculation on Mr. Schreiber's part.

On page 18 of Mr. Schreiber's report, all the northern lines *via* Quebec to St. John and Halifax are set down as having grades of 85 feet to the mile, and curves of  $10^{\circ}$  (top) degrees, making them virtually equal to 109 feet on the mile. (See appendix 4.) This, I am at a loss to understand; true, there is one short grade of 85 feet to the mile between Hochelaga and Mile-End, common to *all* trains passing from Montreal to Halifax, also, three short curves of  $10^{\circ}$  degrees round Bedford Basin, some four miles from Halifax, equally common to all lines; but these have no connection whatsoever with my proposed Chesuncook Line.

There are such grades and curves on the New Brunswick Railway between Hartland—(the objective point of last year's survey of the St. Charles line)—and Canterbury, but as I have before remarked the "Combination Line" would strike Canterbury and not Hartland, and would therefore avoid these objectionable grades and curves, in addition to saving 25 miles of distance. If I had found a dead level between Quebec and Hartland, the usefulness of my survey would still have been destroyed by being connected *there*, with a road having such grades and curves, but I repeat that maximum grades of 35 to 40 feet per mile, and minimum curves of  $4^{\circ}$  degrees, can be obtained all the way from Quebec to Moncton on the "Combination Line," as stated in my supplementary report.

Mr. Schreiber, in his report speaks of thirty (30) lines of railways; thus inferring an exhaustive examination of the subject,—but, the facts show that only five (5) through lines have been, (but imperfectly) surveyed, viz.:

"No. 1."—From "St. Lambert to Mattawamkeag," by Messrs. R. Adams Davy, Moses Burpee, and Parker Spofford.

"No. 2."—From "Megantic to Hervey" by Messrs. Vernon Smith, and Ambrose Duffy.

"No. 3."—From "St. Charles to Hartland" by Messrs. A. L. Light, and Y. B. Fellows.

"No. 4."—From "St. Roch to Edmonston" by Mr. Crawford.

"No. 5."—From "River du Loup to Edmonston" by the same.

Mr. Wicksteed also made a careful barometrical examination from Chaudiere Junction to the Allagash River, *via* the Etchemin valley which I shall have occasion to mention further on. On page 51 of his report, Mr. Schreiber institutes certain "queries" to which he furnishes the replies and comments. I quote them here with my answers.

MR. SCHREIBER.

Query No. 1.

"Mr. Light, in pages Nos. 2 and 3 of his report expresses a belief that the maximum grades between Quebec and Moncton, by way of Chesuncook and Hervey, would be 35 feet to the mile, and that the surveys of last season have established that the grades above mentioned can be obtained between Chesuncook and Hervey."

MR. LIGHT.

Answer No. 1.

The following are my reasons for this belief:

1st. A careful barometrical examination, which I made myself last Spring from Quebec as far as "Baker's Brook"—three-quarters of the distance to Chesuncook—when a most satisfactory line was found. On the remaining fourth part of the line, which I did not examine, Mr. Vernon Smith reports "that from Lake Chesuncook towards Quebec there is a fine level open valley which might be utilized for a direct line to Quebec."

2nd. A subsequent careful examination of the ground by Mr. Wicksteed, C. E., made last Autumn, having for result the corroboration of my figures.

3rd. The testing of the summit by spirit levels, further confirming the same.

I will, in reply, quote the last clause of Mr. Vernon Smith's report, page 32:—"On the whole the route proposed presents a very favorable line for the construction of an economical first-class railway. On the profile shewn there is no gradient exceeding 1 per 100, or 33 feet per mile, and no curve of over 4 degrees, or 1,433 feet radius. With the exception of three places (each of less than 6 miles in length), there is no necessity for even this gradient. By slightly increasing the earth-works I believe that on a re-survey the objectionable points may be greatly improved, and that the whole distance from Hervey to Chesuncook may be covered with gradients not exceeding 35 feet per mile, and with no curve exceeding 3 degrees, or 1,910 feet radius."

"Mr. Vernon Smith's survey, the only one made between Chesuncook and Hervey last season, shews maximum grades of 33 feet to the mile."

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#### MR. SCHREIBER.

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#### MR. LIGHT.

I always considered that a survey of this line was more important, and strongly recommended to Mr. Schreiber that it should be made, by telegram dated 18th August, 1884. His reply was a *peremptory refusal*. Mr. Wicksteed's barometrical examination was subsequently ordered, having the result already stated of corroborating my figures.

#### Answer No. 2.

"This saving of distances is of course, over the Intercolonial Railway route there being no other existing line to compare with.

The distances, I give are as correct as is possible from the data on hand, and are therefore not "very approximate."

The lower altitude of the main summit on this line is alone equal to a saving of about 40 miles of distance,—not to speak of a number of supplementary summits on the "Megantic Line" with deep intervening depressions involving a vast amount of rise and fall which can be only properly equated when a correct profile is submitted. I have already (in the body of my report) made mention of the supplementary summit between Moosehead Lake and Mattawamkeag 950 feet in height, (See Mr. Moses Burpee's report page 40.) It is surely evident that such extraordinary summits overcome with grades of 74 feet to the mile, and curves of 8° degrees must render this line entirely unfit for an inter-provincial freight line railway.

#### Answer No. 3.

"Mr. Light on page 6 gives the distance from Montreal to Halifax via Mattawamkeag at 769 miles.  
"This should be 720 miles."

I estimate the distance *via Lachine*—(for reasons already mentioned)—while Mr. Schreiber measures directly from *Montreal*; this accounts for 20 (twenty) miles of the extra distance he names.

2ndly. East of Mattawamkeag, I measure the distance over the existing lines of railway, through St. John to Halifax; while Mr. Schreiber estimates over 118 miles of country which is *unsurveyed*. (See his report, page 8.)

This fact accounts for the further variance in our figures. I have taken my measurements over the existing lines of railway from a practical conviction that the same will be in use for many a year to come. The details of my distances will be found in Appendix 6, tables 10 and 11, supplementary report, and are as correct as an intimate knowledge of the country and the use of accurate time tables will permit.

## Query No. 4.

"Mr. Light gives on page 6 the distance from Montreal to St. John *via* Mattawamkeag at 498 miles." This should be 450 miles.

## Query No. 5.

"Mr. Light gives on page 7 the distance from Montreal to Hervey *via* Quebec as 248 miles."

"This should be 406 miles."

"He also gives the distance from Montreal to Mattawamkeag as 240 miles."

"This should be 328 miles.

Mr. Schreiber concludes by saying:

"I have not looked into the matter of distances, &c., beyond the 7th page, but I fear they may be no more accurate than those I have remarked upon."

## Answer No. 4.

My reply to "Query No. 3" also covers this ground, and repetition would be unnecessary.

## Answer No. 5.

What I did say was, "the distance from Montreal to Hervey *via* Quebec To BUILD is 248 miles." (See page 55, Engineer's report.)

The omission of these two little words *to build* makes all the difference in the statement.

The "inaccuracy" Mr. Schreiber professes to have discovered in my figures, is owing to the fact that the words "*to build*" have here again been omitted.

## MR. LIGHT.

This is a point which can be very easily verified.

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"It is pretty evident that Mr. Light has been pressed for time, and has not been able to give the matter of this report his personal attention."

To sum up:—On page 6 of his report Mr. Schreiber says, "It thus appears that the line *via* Moosehead Lake and Mattawamkeag is the shortest both to St. Andrew's and St. John," viz:—(Lines Nos. "1" and "2.")

The distance to St. Andrew's and St. John by the said lines is 401 miles—and 451 miles respectively—when the *détour* of 26 (twenty) miles by Lachine is added this distance becomes 421 miles and 471 miles.

The distance by the "Combination Line" to the above places is 53 miles, and 481 miles respectively;—making, *it is true*, an increase of 32 miles to St. Andrew's, and 10 miles to St. John by the "Combination Line"—but, this extra mileage becomes as nothing when placed against the extraordinary summits, steep grades, and sharp curves, common to Lines "Nos. 1 and 2" of Mr. Schreiber.

On page 6 Mr. Schreiber further says "line (No. 6) to Halifax *via* Moosehead Lake, Mattawamkeag, Hervey, Fredericton and Salisbury takes the first place."

He states this line (on page 8) to be "720 miles" in length—adding the *détour* at Lachine it becomes 740 miles; or 30 (thirty) miles longer than the "Combination Line"—and has the same serious drawbacks as lines "Nos. 1 and 2") in the shape of high summits, steep grades and sharp curves. These lines Nos. 1, 2 and 6 pass over the same objectionable ground west of Mattawamkeag, while owing to the low summits and easy gradients on the "Combination Line," double the tonnage could be hauled with the same power,—rendering this the most valuable route for the purposes of an inter-provincial freight railway.

#### TABULATED STATEMENT.

##### COMPARING MR. SCHREIBER'S BEST LINES NOS. "1," "2" AND "6" WITH THE "COMBINATION LINE."

Line No. 1.—Montreal to St. Andrew's.....	401 miles.
add for Lachine <i>détour</i> .....	20 " = 421 miles.
Maximum grades 74 feet per mile, curves 6° degrees.	
Line No. 2.—Montreal to St. John.....	451 miles.
add for Lachine <i>détour</i> .....	20 " = 471 miles.
Maximum grades 80 feet per mile, curves 8° degrees.	
Line No. 6.—Montreal to Halifax.....	720 miles.
add for Lachine <i>détour</i> .....	20 " = 40 miles.
Maximum grades 74 feet per mile, curves 10° degrees.	

III

" COMBINATION LINE."

Montreal to St. Andrew's <i>via</i> Quebec, Chesusuncook, and Canterbury .....	458 miles.
Maximum grades 58 feet per mile, curves $4^{\circ}$ degrees.	
Montreal to St. John <i>via</i> Quebec, Chesusuncook, and Canterbury .....	481 miles.
Maximum grades 58 feet per mile, curves $5^{\circ}$ degrees.	On
Montreal to Halifax <i>via</i> Quebec, Chesusuncook, and Canterbury .....	710 miles.
Maximum grades, Quebec to Moneton, 35 feet per mile, curves $4^{\circ}$ degrees.	

Further,—Lines Nos. "1, 2 and 6," pass so near the American seaboard, that they will inevitably throw the bulk of the heavy freight traffic into American Ports.

This question of inter-provincial routes, is one of vital importance not only to the City and Province of Quebec, but to the Dominion in general. Fuller examinations of the country should be made, in order to arrive at a wise solution of the matter. *The fact is that the country has not been half surveyed*,—for instance: of lines "Nos. 1 and 2," recommended by Mr. Schreiber as the shortest route both to St. Andrew and St. John;—58 miles are unsurveyed, while line "No. 6" to Halifax,—of which he speaks as "taking the first place," has also 118 miles *not surveyed*; thus aggregating on these three lines alone,—174 miles of unsurveyed country. Fuller examinations, would I am confident result vastly in favor of the "Combination Line;" that is, if Canadian interests are to be specially considered.

A. L. LIGHT.

## REVISED SUPPLEMENTARY REPORT

On the proposed "Short Line Railway" to connect Montreal with the Maritime Provinces, with special reference to a Combination Line.

Ottawa, 10th May, 1885.

COLLINGWOOD SCHREIBER, Esq.,  
Chief Engineer, Government Railways,  
&c., &c., &c.

SIR.—In my report on Surveys, dated 23rd of March, I directed attention to a line designated "The Combination Line," to connect Montreal with the Maritime Provinces.

I feel convinced that this line, if established, in connection with a bridge over the St. Lawrence at Quebec, will satisfy, in a marked degree, the traffic requirements of Montreal, Quebec, St. Andrews, St. John, St. Stephen, Fredericton, Halifax and the ports further East, placing all localities on a fair and equal footing.

This Combination Line will run westerly from Canterbury, New Brunswick, to Lake Chesuncook, in the State of Maine, and from Lake Chesuncook, by the valleys of the Famine and Etchemin Rivers, to Chaudière Junction, opposite Quebec, and from thence through the bridge, and North Shore Railway to Montreal.

At Canterbury and Harvey the Combination Line will connect with the railway system of the Maritime Provinces (the New Brunswick and St. John and Maine Railways).

Starting from Chaudière Junction, the line proceeding easterly will traverse the valleys of the Etchemin and Famine Rivers to the height of land, near the village of St. Justin, in the Township of Langelin. The summit is 950 feet above the starting point at Chaudière Junction; 509 feet lower than the summit on the line *via* the Rivière du Sud, about 20 miles to the North. From St. Justin the line will continue its course South-East, and nearly direct to the vicinity of the head of Lake Chesuncook, where it will connect with the line surveyed during the past season by Mr. Vernon Smith, C. E., between that Lake and Canterbury above named.

The country from Chaudière Junction to Lake Chesuncook lies in such a low valley or depression that it forms the natural direct route for a line of railway between the Province of Quebec and the Maritime Provinces, and presents an unexceptionable channel for the passage of freight to the seaboard. Mr. Vernon Smith reports equally favorably on the line between Lake Chesuncook and Canterbury.

This line has an immense advantage in its lower summit and easier gradients, equivalent fully to a virtual saving of 25 miles of straight and level road (see Appendix No. 4). Grades of 35 to 40 feet to the mile, and possibly less, can certainly\* be obtained both ways from Quebec to Moncton without any great additional expenditure for earth and rock excavations and masonry; these items of cost being alone affected by the reduction of grades.

The grounds for this opinion are as follows:—

The Etchemin summit, 950 feet above the Chaudière Junction, is overcome in about 50 miles, being an average ascent of only 19 feet per mile; the ascent to the Etchemin and Famine Valleys, along which the line would pass, is generally regular, there being but three breaks viz., one small waterfall at St. Anselme, and another at St. Claire, each about 8 feet in height, and a stretch of level, about one mile long, at Standon, all of which can be easily overcome by 35 feet grades.

East of the summit, on the descent to Lake Chesuncook, the principal impediments are the three upper branches of the St. John River, which will be crossed within a distance of 20 miles. They lie about 100 feet below the summit level. The two which I have personally examined are in gentle depressions, with no formidable highlands intervening.

The distance from the summit to Lake Chesuncook, is about 50 miles; half of this distance, at the southern end, would be on the streams flowing into the Allequash and into Lake Chesuncook, no serious difficulties will be met here.

The surveys of last season, by Mr. Smith, have established that the grades above mentioned, can be obtained from Chesuncook to Canterbury.

The eastern extension of the Combination Line from Canterbury to Harvey, would give St. John a good connection: while another extension from Canterbury, along the right bank of the St. John, would continue this system of easy gradients to Fredericton, at which place the River St. John must be bridged, and the line continued to the head of Grand Lake, for the most part through a flat country, to Salisbury, there intersecting the Intercolonial Railway, 15 miles west of Moncton.

This line would have a marked effect on the trade with the Maritime Provinces, and would go far to compensate for the increased distance to these ports, as compared with the railways in operation at Portland, Boston and New York. (See synopsis of distances from Callendar to St. John and Halifax via Chesuncook, Appendix 6.) It would save about 150 miles of railway to Halifax and nearly double that distance to St. John, over the Intercolonial Railway.

The proposed line should be thoroughly constructed with rails and bridges, sufficiently strong to carry the Consolidation Engines (now so much in use in Pennsylvania) capable of hauling a gross load of 800 to 1,000 tons, over its grades, or nearly double that which could be hauled on the Intercolonial Railway with the same power, and little additional cost per train mile.

\* In my first supplementary report, dated 26th March, I said: "grades of 35 to 40 feet to the mile, and possibly less, can I think be obtained." The subsequent publication of Mr. Vernon Smith's and Mr. Wicksteed's reports has rendered this a certainty, therefore I have omitted it.

ver summit and of 25 miles of 35 to 40 feet gained both ways expenditure for of cost being

The railways from the Province of Quebec to the Ports of Boston and Portland, although apparently shorter, have to ascend the higher lands of the Watershed, near the Boundary, and, have therefore much higher summits and steeper gradients.

The Ogdensburg and Portland Railway passes over a summit of the White Mountains in New Hampshire, 1890 feet above the sea level, with maximum grades of 116 feet to the mile, and minimum curves of  $9^{\circ}$  degrees (633 feet radius).

This difference in summit heights alone, between the New Hampshire (American) and the Etchemin (Canadian) lines, to say nothing of the easier grades and curves of the latter, would equate in the latter's favor equal to a virtual reduction of 34 miles in distance, carriage of heavy freight. (See Appendix No. 4).

In carrying Western freight *via* Ottawa to Quebec, much of it will naturally pass over the North Shore Railway and by means of the proposed Bridge at Quebec to the several Ports of the Maritime Provinces; consequently it would follow that some point west of Montreal, and not Montreal itself, should be the starting point from which comparison of distances should be made.

A clear saving of 30 miles distance to Hull, as compared with the route following the C. P. Railway to Carleton Place, and thence Ottawa, would be effected by taking Chalk River Station on the C. P. Railway as the diverging point. Crossing the Ottawa and carrying the line to Hull along the North shore of the river, *via* the Pontiac and Pacific Junction Railway, of which 80 miles, or about one-third of its length are built, would so reduce the length as will be established than from the following table of distances:—

from Canterbury to Ottawa.....	2 miles.
..... while another route follows the St. John River to Fredericton, at which point the line continued via flat country, to Hull, 15 miles west of Fredericton.....	
..... via C. P. Railway to Carleton Place and Chalk River Station.....	126 "
..... via Ottawa to Hull to Chalk River Station <i>via</i> Pontiac and Pacific Junction.....	128 "
..... Saving.....	95 "
	33 miles.

With the Main Line in operation the increased distances from Montreal, as at present; but no railway hauler would haul Western freight, destined for Quebec and other ports, an additional  $12\frac{1}{2}$  miles past St. Martin's Junction, into Montreal and out again; in all an unnecessary 25 miles haulage.

Instead of hauling freight this extra distance, a loop line, 10 miles in length, by a level route, could be cheaply and easily constructed (for \$100,000) between St. Thérèse and Terrebonne, which would effect a saving of 80 miles of distance; this, added to the saving between Chalk River and Hull, already mentioned, would give a clearing of 68 miles.

Should the alternative line, from Lachute to Quebec, be adopted, Lachute made the distributing point, a further saving of about 17 miles would be made, [making 80 miles in all].

des of 35 to 40 feet publication of May, therefore I have

This saving of actual distance, added to a virtual saving of 8 miles, by reduction of summit heights as already stated, would operate in favor of Canadian, as compared with American Ports, by reducing the distances to the former.

For instance, the distance from Lachute to St. John, via Quebec and Chesuncook, is..... 485 miles  
The distance from Lachute to Portland, via Mile End, La-  
chine, Portland and Ogdensburg (the shortest route) is. 358

Difference in favor of Portland.....	132	"
Deduct equation of distance due to lower summit.....	84	"
Virtual difference but.....	98	"

If the "cut off" from Chalk River Junction to Hull, via the Pontiac and Pacific Junction already named, be used, this distance will be reduced to 65 miles.

The easier grades and curves on the Quebec line would materially reduce this latter distance, in as much as the strongest freight engine will haul forty loaded cars over the Canadian line, whereas the same engine could only haul 17 loaded cars over the Portland and Ogdensburg Railway, thus nullifying the shorter distance to Portland, as compared with that to St. John.

This admitted—the Canadian Sea-ports of Andrews and L'Etang, some sixty miles West of St. John—on ice, and capable of being made good harbors—are actually about as near Montreal as Portland.

To instance one of the beneficial effects which a low system of gradients would have on the trade with the Maritime Provinces: the coal and minerals of the latter could, by this Combination Line, be carried for less than half a cent per ton per mile.

The line would pass directly through the extensive coal fields at the head of Grand Lake, New Brunswick, mentioned in the reports of the Geological Survey, one seam alone of which is estimated to contain one hundred millions of tons of coal, so near the surface that it may be quarried and not mined.

This mineral, at present almost excluded from commerce in the isolated district, could be carried as return freight, ensuring loaded trains both ways; and bituminous coal, reported to be excellent for forging and other purposes, could be delivered at Quebec, Montreal and Ottawa, for \$8, \$8.86 and \$4.88 per ton. (See Appendix No. 5.)

I have prepared several tables of approximate distances from Caledon to Lake Chesuncook,—the common point of divergence of the projected lines from Montreal to St. John and Halifax via Quebec and Lake Megantic.

These tables are as nearly correct as the present state of the surveys will admit, and shew that if each line runs into and out of Montreal by the proposed modes of ingress and egress, there will be saving in distance from Montreal via Quebec of at least 10 miles; the saving, to be effected by the adoption of what has been here termed the "Combination Line."

Another line has been advocated, which from the stand-point of Quebec's interests, extends not the slightest advantage sought after, but, is on the contrary diametrically inimical to such interests, *all connection with it, from Quebec being perfectly impracticable.*

This line, termed the "International," has been traced *via* Sherbrooke and Lake Megantic, to be carried across the State of Maine through Moosehead Lake, and from thence to Mattawamkeag, on the Maine Central Railway.

The disadvantages to Quebec of such a line may be briefly stated:

1st. No connection from the City of Quebec can be made with it, and *if it could*, the extra length would destroy its usefulness.

2nd. Instead of being a short line to the Maritime Provinces, it will have the effect of actually diverting Western trade from them, to the several United States harbours in the neighbourhood of Bangor, Maine.

3rd. By it, the distance to Halifax and St. John, from Montreal, is increased some 57 miles, and 10 miles, respectively, as compared with distances *via* the "Combination Line."

Distance from Montreal to Halifax *via* Megantic, Mattawamkeag and St. John..... 767 miles.  
 " " *via* Quebec and Chesuncook..... 710 " "

Saving in favor of Quebec..... 57 "

Distance from Montreal to St. John *via* Megantic and Mattawamkeag..... 491 "  
 " " *via* Quebec and Chesuncook..... 481 "

Saving *via* Quebec..... 10 "

Vide table 10—Appendix 6.

Nor would this Mattawamkeag connection materially benefit Halifax, as it is but 89 miles shorter to Montreal than by the Intercolonial, which saving would be greatly nullified by the sharp grades and curves and high summits of the "International" line.

Should the International connection be made *via* Greenville, on the "Bangor and Piscataquis" Railway, and that line utilized to Milo and Passadumkeag, as has been suggested, some 34 miles must be added—making the increased distance to St. John and Halifax 91 miles and 44 miles respectively—instead of 57 and 10, as before stated.

Distance from Montreal to Halifax *via* Passadumkeag..... 801 miles.  
 " " " " " " *via* Quebec..... 710 "

91 "

Distance from Montreal to St. John *via* Passadumkeag.... 525 "  
 " " " " " " *via* Quebec..... 481 "

44 "

(See Appendix 6, table 11.)

The distances to build from Montreal to Harvey, the intersecting point of the Maritime system *via* Quebec, and from Montreal *via* Mattawamkeag are nearly equal, as follows, viz:

Montreal to Harvey <i>via</i> Quebec.....	248 miles
"      to Mattawamkeag <i>via</i> Megantic.....	240   "
	<b>Saving <i>via</i> Megantic.....</b>

**8   "**

In conclusion, the proposed "Combination Line" for the projected Short Line Railway between Montreal and the ports of St. John and Halifax is based on true commercial principles. It passes over the lowest summits, and with far easier gradients and curvature than can be obtained by any other line crossing from the valley of the St. Lawrence to the Atlantic seaboard, permitting of the hauling of forty loaded cars, against twenty the other way; in fact, a line which must bring the freight of the West to the ports of the Maritime Provinces and the coal of those Provinces to Ontario and Quebec, thus ensuring the prosecution of economical inter-provincial freight relations.

The link between Lake Chesuncook and Lake Megantic, while not making the line *via* Sherbrooke an interprovincial trunk line, would nevertheless give the Maritime Provinces direct communication with the Eastern Townships, and a new market for their coal, and would create a short route to the City of New York, and the building of this link (Lake Chesuncook to Lake Megantic) in connection with that which I propose from Lake Chesuncook to Quebec, would complete a system which would meet every requirement of both freight and passenger business, including that of the passenger business for Europe, which I have no doubt will be got from the United States, *via* the Passumpsic Railway and Sherbrooke—if Louisbourg becomes, as expected, a port of call for Ocean steamers.

#### SUMMARY.

Comparison between projected Short-Line from Montreal to the Ports of St. John and Halifax *via* Quebec and Lake Megantic.

East of Canterbury the lines diverge to St. John and Fredericton. West of Canterbury to Lake Chesuncook, the Trunk line will be in common.

West of Lake Chesuncook, the Quebec line passes by the valleys of the Famine and Etchemin Rivers, to Chaudière Junction and Quebec, and *via* North Shore Railway to Montreal.

The International Link passes by Lake Megantic, Sherbrooke and Lachine to Montreal.

Distances from Montreal to Lake Chesuncook (common point)—

<i>via</i> Lake Megantic (vide Appendix 6, table 5).....	288 miles
<i>via</i> Quebec (vide Appendix 6, table 6).....	278   "
<i>via</i> Lachute (common point for Western business) to	
Chesuncook by Megantic.....	325   "
Quebec.....	275   "

**Saving by Quebec.....** **50   "** |

The distances East of Chesuncook, between the latter place and St. John and Halifax, are not affected, therefore need not be considered here,—they are given however in tables 7, 8, 9, 10, 11 and 12, in comparison with the Intercolonial (vide Appendix 6.)

The mileage to be built West of Lake Chesuncook to Montreal—

via Megantic is.....	215 miles.
via Quebec is.....	111 "

The mileage to build East of Lake Chesuncook to Harvey (the intersecting point of the Maritime system) is the same by either line, viz.:..... 187 miles.

The distance to build from Montreal to Harvey via Quebec and from Montreal to Mattawamkeag via Megantic are nearly equal, as follows:

Montreal to Harvey via Quebec .....	248 miles.
Montreal to Mattawamkeag via Megantic .....	240 "

Saving by Megantic..... 8 "

Maximum gradients via Megantic line (vide Chief Engineer's Railway Report, 1882)..... 74 feet.

via Quebec .....

40 "

Summit above sea level via Portland and Ogdensburg R'y. 1890 "

via Megantic, height unknown to me, said to be. 2000 "

via Quebec and Etchemin River..... 1200 "

Haulage power.—Forty loaded cars can be hauled via Quebec.

— Twenty " " " Lake Megantic.

Cost of completing projected line between Montreal and Chesuncook, (see Appendix 7.)

via Lake Megantic, including Lachine Bridge..... \$10,240,000

via Quebec, including Quebec Bridge..... 8,470,000

Saving via Quebec..... \$ 1,770,000

Cost of completing projected line between Montreal and Mattawamkeag, (see Appendix 8.)

via Lake Megantic, including Bridge..... \$11,200,000

via Quebec (including Bridge) to Harvey via Chesuncook..... 10,500,000

Saving via Quebec..... \$ 700,000

The line from Quebec to Chesuncook would pass through the best lumber lands of Maine, the lumber would be shipped from Quebec, and the freight be worth millions of dollars to Canada. This ton would be lost, by lines passing through the more Southern part of the State. (See Mr. Edward Jack's letter, one of the most intelligent lumber explorers of New Brunswick, (Appendix 3.) The line from Quebec and Chesuncook will make Northern Maine tributary to Canada.

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.... 288 miles.

.... 278 "

to

.... 825 "

.... 275 "

..... 50 "

The Southern line *via* Megantic and Passadumkeag passes through a sterile part of Maine and is intersected by several United States Railways, which will inevitably cause the trade of Canada to flow to United States seaports.

The line *via* Quebec and Chesusnook traverses about 77 miles less of American territory than the Southern line *via* Megantic and Mattawamkeag, and 114 miles less than that *via* Passadumkeag. (Vide Appendix 8, table 12.)

There are two lines now to Sherbrooke from Montreal,—one by the Grand Trunk, the other *via* St. John's, Farnham, Waterloo and Magog. Why build a third line, when the counties South-east of Quebec are destitute of railways?

The bridge at Quebec does away with the necessity of the Lachine Bridge:

The bridge at Lachine does not save the building of the bridge at Quebec, which must be constructed eventually to connect the Pacific with the Intercolonial, and thereby complete our national railway.

The Lachine Bridge is incomplete until a new line, some 120 miles long, is built to Smith's Falls or Carleton Place, which line is an essential part of a contemplated through route (*via* Lachine Bridge) to Portland, thus duplicating the line between Ottawa and Montreal, while an extension to Quebec is unprovided.

What does Canada want with a second line to Portland, while her own seaports are not connected by the shortest commercial line with Montreal?

The freight which is taken across the St. Lawrence above Montreal will naturally flow to New York, Boston and Portland, while, if directed *via* the North Shore Railway through Quebec, it must find its way to the Canadian Maritime Ports.

I remain, Sir.

Your obedient Servant

(Signed), A. L. LIGHT, { M. Inst. C. E., Great Britain.  
Mem. American Asso. C. E.

**Chief Engineer Government Railways,  
Province of Quebec.**

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COMPARISON between the several routes for the projected Short Line Railway between Montreal and the Ports of St. John and Halifax, that is, by the two lines, by Sherbrooke and the Combination Line *versus* Quebec.

DESCRIPTION OF LINE	Locality.	Via		Difference in favor of Quebec.
		Sherbrooke.	Quebec and Combination Line.	
From Montreal, <i>via</i> Megantic and Passadumkeag, to.....	St. John	535	481	44
do do	Halifax.	891	710	91
do do	St. John	491	481	10
do do	Halifax.	† 767	710	67
do do	St. John	491	481	10
do do	Halifax.	720	710	10
do do	St. John	663	486	78
do do	Halifax.	839	761	78
do do	St. John	899	486	44
do do	Halifax.	805	761	44
do do	74	40	34	.....
Grade Maximum per mile.		.....	4 degrees.	.....
Curves Minimum.		2,000	1,200	800
Greatest Altitude above sea level, say.....		.....	20 loaded cars.	20
Baileys Power, Consolidation Engines.....		.....	.....	.....
Cost, including Bridges over St. Lawrence in both cases, <i>via</i> Combination lines to.....		10,240,000	8,470,000	1,770,000
Chesuncook, (see Appendix 7).....		.....	.....	.....
Cost, including Bridges in both cases, to Mattawamkeag <i>versus</i> Combination line to.....		11,200,000	10,500,000	700,000
Harvey, (see Appendix 8).....		.....	.....	.....

† The distances *via* Passadumkeag and Mattawamkeag are based on the assumption that the extension *Eastward* from these to Montreal will be carried to St. John and over the existing lines of railway.

\* These estimates are based on the assumption that the Syndicate carry out their intention of bridging the St. Lawrence at Lachine, and building a line from Lachine to Sherbrooke. In the last estimate *via* the Combination Line to Harvey, the Quebec Bridge and connecting lines are estimated for single track, in order to institute a fair comparison with the Lachine Bridge.

These tables of distances have been prepared with great care:—  
1st. From a personal examination of some 500 miles of the lines during the past season. 2nd. From time-tables where existing lines are used. 3rd. From the best maps extant (where surveys have not been made). 4th. From an accurate personal knowledge of the general features of the three Provinces; having been Chief Engineer of Government Railways for a long period in the Provinces of Nova Scotia, New Brunswick and Quebec, and are therefore as nearly correct as can be made without final location surveys.

The height of the summit, above sea level, on the International Railway *via* Lake Megantic is unknown to me. It is of paramount importance that it should be examined before a decision is arrived at. It has been variously reported, by competent Engineers, at 2,400 and 2,000 feet respectively above sea level. This difference in altitude is equivalent to an additional mile of level line for every 20 feet of extra height, thus virtually lengthening the International line, if the lower height is taken 40 additional miles for purposes of heavy traffic. (See Appendix 4.)

ADVANTAGES TO RESULT FROM PROJECTED QUEBEC  
RAILWAY BRIDGE.

Imperial and National.

To connect and complete the Canadian Transcontinental Railway.  
" the railway system of Canada on both sides of the St. Lawrence, and at the most eastern point where it is possible to span the river.

The only effective mode of making this connection to ensure safety and regularity.

A connection for the Intercolonial at Quebec with the North Shore Railway, establishing competition.

Access for the Grand Trunk to the new Quebec Docks, thus removing the motive which impels the Grand Trunk Railway to refuse to sell the North Shore.

Principal of Bridge—The Cantilever.  
length of Central Span—1442 feet.

" of the Firth of Forth now in course of construction—1700 feet.  
data carefully worked out by me, and by Mr. Brunlees, the Eminent English Engineer.

Plans ready.  
Cost of Bridge proper \$5,000,000 for double track, if single track with trestle approaches \$3,000,000.

Offer for construction of Bridge—4 p.c. guarantee for 25 years, materials duty free.

Annual outlay on Bridge—Capital \$5,000,000.

Working expenses 1 p.c.,.....	\$ 50,000
Sinking fund 1 p.c.....	50,000
Interest @ 4 p.c.....	200,000
	<u>\$800,000</u>

Annual revenue on opening of Bridge based on actual movement of trains:—

Intercolonial Railway.

Quebec Central "

Grand Trunk "

North Shore " 82,622 cars at @ \$4..... 830,528

Surplus after meeting all annual charges..... \$ 30,528

B.—See Mr. Sbanly's letter annexed.

## APPENDIX 2.

[Copy] Montreal, 23rd March, 1885.

MY DEAR SIR,—Referring to our conversation of a few days ago as to the traffic likely to be served by the proposed Cantilever Bridge over the St. Lawrence above Quebec, it would seem not extravagant to count on eight trains each way, with an average of 20 cars to train, for every working day in the year. Of the Eastern-bound cars all, of the West-bound perhaps one-fourth, would be fully loaded and therefore toll-paying.

An average charge of Four Dollars per loaded car, taking passenger and freight service together, would be not more than a reasonable toll.

RESULT:—160 Cars bound East,  
40 " " West.

200 Cars at \$4.00.....	\$800 per day.
Annual Revenue (318 days).....	\$250,400.

The several lines converging on the river at and opposite to Quebec will, as regards Through Traffic, have been built in vain if they fail to furnish the amount of business indicated by these figures.

The photographed drawing of the bridge conveys an impressive idea of the grandeur of the structure.

There would, and could, be nothing to compare with it on the continent, for there is only one river St. Lawrence.

As to reducing the Masonry in Piers and Approaches it would be a pity for the sake of any small economy to take away from the design anything that, wanting, would in the least detract from the majesty of its appearance.

Yours very truly,

(Signed.) W. SHANLY.

A. L. LIGHT, Esq., C. E.

N.B.—If the coal mines are developed as anticipated the cars will run full both ways.

(Signed.) A. L. L.

## APPENDIX 3.

Copy]

Ottawa, 11th March, 1885.

SIR.—In reply to your enquiries as to the timber on the St. John river, I beg to say, that more than three quarters of the timber remaining on the St. John and its tributaries is on its upper waters, namely on that portion of the St. John which is above the Grand Falls, including, of course, the branches of that river which lie in the province of Quebec and in the State of Maine. Much of this is not now available on account of the cost of portaging as well as the length of river driving required to bring it to the sea board and other attendant difficulties, which the construction of a railroad would remove. Such a road would be the means of bringing to the St. Lawrence for shipment to Great Britain vast quantities of spruce deals and other lumber. There is also a great deal of cedar in this country. The traffic in cedar shingles and sleepers is becoming a very important industry; both of these are now being carried from Edmundston by rail to Bangor and Boston.

The proposed railroad will be the means of employing thousands of the habitants residing on the shores of the St. Lawrence, while the lumber camps in Quebec and Maine will consume the farmers' hay and oats, as well as give employment to their sons and horses during the winter.

I do not hesitate to say that the construction of this road through these timber lands will be a great public boon to the French farmers and woodsmen residing on the South side of the St. Lawrence in the vicinity of and below the city of Quebec. There is here a great demand for more employment, where a portion of the country is of poor quality for farming. It would certainly also be the means of bringing millions of dollars worth of lumber to the banks of the St. Lawrence for shipment.

As to the quantity of timber in this country I can make no estimate. I know that it is very large and to get data on which to base an estimate would demand the expenditure of time and money.

Should this railroad be taken to the Southward of the head of the St. John, most of the benefits accruing from its construction down the Daagwaam and crossing the Alleguash will disappear, and the benefits instead of being conferred upon the French laboring population of Quebec, will be conferred on the people of the State of Maine.

Yours respectfully,

(Signed.)

EDWARD JACK,

Crown Land Surveyor.

A. L. L.

L. LIGHT, Esq., C. E.

## APPENDIX No. 4.

## EFFECTS OF HIGH SUMMITS, GRADES AND CURVES.

In deciding which of the lines is the most eligible for practical business purposes, the comparison of the heights of their respective summits, is a matter of paramount importance. It may be remarked that in the case of heavy freight trains (running at their most economical speed of 12 miles an hour) it is held as a maxim, that in the consumption of fuel, an additional 20 feet of elevation passed over, is equivalent to an additional mile of straight and level line.

The summit by the Etchemin is 509 feet lower than that by the Rivière-du-Sud, the saving of fuel in the carriage of freight by the former line, rather than by the latter, due to the difference of altitude alone, would be sufficient to carry the whole freight traffic over 2 miles of level track.

## REMARKS ON CURVES.

The question of curvature is also one of the highest importance. According to L. H. Vose, Professor of Civil Engineering in Bowdoin College, and other eminent scientific and practical authorities, the resistance due to curvature, to freight trains upon a  $10^{\circ}$  curve, is equal to a grade of 24 feet per mile, or 2.4 feet for each degree of curvature. A  $10^{\circ}$  curve, combined with a 58 ft. grade per mile, therefore is a great obstacle to heavy freight traffic, as a 77 feet per mile grade on a straight line.

## APPENDIX No. 5.

## GEOLOGICAL SURVEY OF CANADA, 1878-1879. 20 II.

" Assuming the average thickness of the surface seam around the head of Grand Lake at 20 inches, and allowing the available yield of coal for a seam one foot thick to be 1,000 tons per acre, (Richard Brown, F.G.S., estimates that each acre of coal, one foot in thickness (in Cape Breton) contains 1,500 tons, taking the specific gravity at 1,250, we have, from the coal basin of Newcastle and Coal Creek, and Salmon River, which may be stated to contain about 100 square miles, a total available yield of coal, due allowance being made for waste, of over 100,000,000 tons for this limited area alone—it may fairly be presumed that with economical management and a proper system of working, a large portion of this enormous quantity might be profitably extracted."

Ottawa, March 10th, 1885.

SIR,—I have been at the Coal Mines at Newcastle, Grand Lake, and examined the same, they are worked in a very primitive manner, the coal being hauled in carts a distance of from 3 to 5 miles, to the Grand Lake.

So far as I could ascertain, about 6,000 tons are raised per year, this is used for house and blacksmith purposes; it carries, in some instances, a good deal of sulphur and leaves considerable ash, it is an excellent cokeing coal, and so far as I can learn, is one of the very best coals in use for heavy forgings.

The beds are close to the surface, in some instances being on it, or even but 12 feet below.

The coal is delivered from the beds on the surface for \$1 per ton, or perhaps rather under that sum.

(Signed,) EDWARD JACK,  
Crown Land Surveyor  
for New Brunswick.

L. LIGHT, C. E.,  
Chief Engineer Government Railway,  
Province of Quebec.

Cost of delivering bituminous coal from the mines near Grand Lake at Quebec, Montreal and Ottawa at  $\frac{1}{2}$  cent per ton per mile for carriage and \$1.50 per ton for mining and loading on cars would be follows:—

## AT QUEBEC.

Grand Lake to Quebec, 300 miles transportation @ $\frac{1}{2}$ c. p. mile.....	\$1.50
Mining and loading on cars.....	1.50
Cost of delivery.....	<u><u>\$3.00</u></u>

## AT MONTREAL.

Grand Lake to Quebec, 800 miles.  
Quebec to Montreal, 173 "

Transportation..... 473 miles @  $\frac{1}{2}$  c. per mile..... \$2.3  
Mining and loading on cars..... 1.5

Cost of delivery..... \$3.8

## AT OTTAWA.

Grand Lake to Quebec, 800 miles.  
Quebec to St. Martin's Junction, 160 "  
St. Martin's Junction to Ottawa, 107 "

Transportation..... 567 miles @  $\frac{1}{2}$  c. per mile..... \$2.8  
Mining and loading on cars..... 1.

Cost of delivery..... \$4.

## APPENDIX No. 6.

STANCES FROM CALLENDER TO CHESUNCOOK BY 4 DIFFERENT ROUTES.

1.—Traversing the Canadian Pacific *via* Carleton Place and Ottawa to Montreal; thence back to Mile End and Lachine to Chesuncook. Total distance 633 miles as per details:—

Calender to Montreal.....	345 miles
Montreal back to Lachine.....	11 "
Lachine to Sherbrooke.....	104 "
Sherbrooke to Lake Megantic.....	69 "
Lake Megantic to Chesuncook.....	104 "

Total distance..... 633 miles

2.—From Callendar *via* Carleton Place and Ottawa to Montreal, then back to St. Martin's Junction to Chaudiere Junction and by Etchemin Valley to Lake Chesuncook. Total distance 623 miles.

Calender to Montreal.....	345 miles.
Montreal back to St. Martin's Junction.....	12 "
St. Martin's Junction to Chaudiere Junction...	161 "
Chaudiere Junction to Chesuncook.....	105 "

Total distance..... 623 miles.

3.—Callendar to Lake Chesuncook *via* Chalk River Station and Pontiac and Pacific Junction Railway to Hull and Montreal; then back by St. Martin's and Chaudiere Junction, and by the Etchemin Valley Combination Line to Chesuncook. Total distance 587 miles, as per details:—

Callendar to Chalk River Station.....	99 miles.
Chalk River Station to Hull by Pon. & Pac. Junc. R'y..	92 "
Hull to Montreal by Canadian Pacific Railway.....	118 "
Montreal back to St. Martin's Junction.....	12 "
St. Martin's Junction to Chaudiere Junction.....	161 "
Chaudiere Junction to Chesuncook.....	105 "

Total distance..... 587 miles.

4.—By North of the Ottawa:—

Callendar to Lake Chesuncook, *via* Chalk River Station and Pontiac and Pacific Junction Railway to Hull, thence by St. Thérèse and North Shore Railway, and Quebec bridge to Chaudiere Junction, and Etchemin Valley to Chesuncook:—

Total distance.....	556 miles.
Callendar to Chalk River, by Canadian Pacific R'y..	99 "
Chalk River to Hull, by Pon. and Pac. R'y.....	92 "
Hull to St. Thérèse, by Can. Pac. R'y.....	99 "
St. Thérèse to Chaudiere Junction, <i>via</i> N. S. R'y... 161 "	"
Chaudiere Junction to Chesuncook .....	105 "

Total distance..... 556 "

No. 5.—Distance from Montreal to Chesuncook, *via* Lachine and Lake Megantic :—

Total distance.....	288	miles.
Montreal to Lachine.....	11	"
Lachine to Sherbrooke.....	104	"
Sherbrooke to Lake Megantic.....	69	"
Lake Megantic to Chesuncook.....	104	"
Total distance.....	<u>288</u>	"

No. 6.—Distance from Montreal to Chesuncook, *via* St. Martin's Junction and Quebec :—

Total distance.....	278	miles.
Montreal to St. Martin's Junction.....	12	"
St. Martin's Junction to Chaudière Junction.....	161	"
Chaudière Junction to Chesuncook.....	105	"
Total distance.....	<u>278</u>	"

No. 7.—Distance from Montreal to Halifax, by Grand Trunk to Levis and Levis to Halifax, by Intercolonial Railway :—

Total distance.....	856	miles.
Montreal to Levis.....	172	"
Levis to Halifax.....	684	"
Total distance.....	<u>856</u>	"
Distance to St. John, New Bruntwick.....	760	"

No. 8.—Montreal to Halifax, *via* Lachine, Megantic and Chesuncook :—

Total distance.....	720	miles.
Montreal to Lachine, <i>via</i> Can. Pac. R'y.....	11	"
Lachine to Sherbrooke.....	104	"
Sherbrooke to Megantic.....	69	"
Megantic to Chesuncook.....	104	"
Chesuncook to Canterbury.....	111	"
Canterbury to Moneton.....	134	"
Moneton to Halifax.....	187	"
Total distance.....	<u>720</u>	"
Montreal to St. John :—		
Montreal to Canterbury, as above.....	399	"
Canterbury to Harvey.....	26	"
Harvey to St. John.....	66	"
Total distance.....	<u>491</u>	"

No. 9.—Montreal to Halifax, *via* St. Martin's Junction, Quebec and Chesuncook :—

Montreal to St. Martin's Junction.....	12 miles.
St. Martin's Junction to Chesuncook.....	269 "
Chesuncook to Canterbury.....	111 "
	389 miles.
Canterbury to Moncton.....	134 "
Moncton to Halifax.....	187 "
	321 "
Montreal to Halifax, total distance.....	710 "

Montreal to St. John :—

Montreal to Canterbury, as above No. 9.....	389 miles.
Canterbury to Harvey.....	26 "
Harvey to St. John.....	66 "
	481 "
Total distance.....	481 "

No. 10.—Montreal to Halifax via Lachine, Mattawamkeag and Vanceboro' :—

Montreal to Lachine.....	11 miles
Lachine to Sherbrooke.....	104 "
Sherbrooke to Moose River.....	93 "
Moose River to Mattawamkeag.....	136 "
Mattawamkeag to Vanceboro'.....	56 "
Vanceboro' to St. John.....	91 "
	491 miles
St. John to Moncton.....	90 miles.
Moncton to Halifax.....	186 "
	276 miles
Total to Halifax.....	769 miles
To St John as above.....	491 "

No. 11.—Montreal to Halifax, *via* Lachine, Lake Megantic, Greenville, Milo, Passadumkeag and Vanceboro' :—

Montreal to Sherbrooke.....	115 miles.
Sherbrooke to Moose River.....	93 "
Moose River to Greenville.....	61 "
Greenville to Milo.....	55 "
Milo to Passadumkeag.....	27 "
Passadumkeag to Vanceboro'.....	83 "
Vanceboro' to St. John.....	91 "
	525 miles.
St. John to Moncton.....	90 "
Moncton to Halifax.....	186 "
	801 "

## No. 12.—Miles in Maine, U.S.

a. *Via* Lachine, Lake Megantic, Greenville and Passadumkeag :—

Moose River to Greenville.....	61 miles.
Greenville to Milo.....	55 "
Milo to Passadumkeag.....	27 "
Passadumkeag to Vanceboro'.....	83 "
	—
	226 miles.

b. *Via* Lachine, Lake Megantic and Mattawamkeag :—

Moose River to Mattawamkeag.....	136 miles.
Mattawamkeag to Vanceboro'.....	56 "
	—
	192 "

c. "Combination Line," *via* Lake Chesuncook..... 116 "

## Synopsis of distances and miles to build :—

		Miles to Build	Distances.
1—Montreal to Halifax via N. Shore R'y, Quebec and Intercolonial R'y.....	856		
St. John   do   do   do   do   do   do	760		
2—Montreal to Halifax via N. Shore R'y, Quebec, Riv. Ouelle, Edmundston			
Grand Falls and Moncton	756	284	
Do   do   do   Riv. du Loup, do do	771	284	
St. John   do   do   do   do   and Fredericton	611	98	
3—Montreal to Halifax via N. Shore R'y, Quebec, Chesuncook, Canterbury			
St. John   do   do   do   do   do   and St. John	754	248	
4—Montreal to Halifax via N. Shore R'y, Quebec, Chesuncook, Canterbury, Fredericton and Moncton			
St. John   do   do   do   do   and Canterbury.....	481	248	
5—Montreal to Halifax via Sherbrooke, L. Megantic, Mattawamkeag and			
St. John   do   do   do   do   do   St. John	769	240	
St. John   do   do   do   do   do   493	493	240	

## APPENDIX No. 7.

Approximate estimate of the cost of the number of miles of new railway required to connect Montreal with Lake Chesuncook, the most eligible common point of divergence *via* Quebec and *via* Lake Megantic respectively :—

## MONTREAL CONNECTIONS.

Mile End Station to Lachine including heavy land and other damages, say.....	\$1,000,000
* Lachine Bridge complete with permanent approaches..	3,000,000
Lachine to Sherbrooke (new line) 104 miles @ \$30,000	
per mile.....	3,120,000
Lake Megantic to Chesuncook 104 miles @ \$30,000 p. mile..	3,120,000
	—
	\$10,240,000

\* This Bridge has been variously estimated at from one and a half to four millions. It is designed for single track with about half a mile of trestle work on the Southern end. The Victoria Bridge cost seven millions. If designed for double track on the same substantial manner as the Quebec Bridge; it will certainly cost three millions of dollars.

## QUEBEC CONNECTIONS.

‡ Quebec Double Track Bridge complete with the most solid and permanent work and approaches.....	\$5,060,000
8 miles new (double track) railway connecting the Bridge with North and South Shore system @ \$40,000 per mile.....	320,000
Chaudiere Junction to Chesuncook via Etchemin and Famine Valleys 105 miles @ \$30,000 per mile.....	3,150,000
	<hr/>
	\$8,470,000
Saving by Quebec system.....	<u>\$1,770,000</u>

‡ The net cost of this Bridge according to my estimate and carefully revised by Mr. James Brunless, the eminent English Engineer, is £887,000 stg., or \$4,319,000; the balance of the \$5,000,000 being for contingencies, administration, engineering and other expenses.

It is designed for a double track with solid approaches of arched masonry. The cost can be reduced to \$3,000,000 by changing the design to single track, with approaches of steel trestle work, instead of arched masonry.

## APPENDIX 8.

Approximate estimate of the cost of the two lines, one *via* Lachine, Megantic and Moosehead Lake to Mattawamkeag. The other *via* Quebec and Chesuncook to Harvey.

## LACHINE TO MATTAWAMKEAG.

Mile End to Lachine, 7 miles includindg heavy land and other damages.....	\$ 1,000,000
Lachine Bridge.....	3,000,000
Lachine to Sherbrooke, 104 miles @ \$30,000 per mile.....	3,120,000
Moose River to Mattawamkeag, 136 miles @ \$30,000 per mile.....	4,080,000
	<hr/>
	\$11,200,000

## QUEBEC CONNECTION.

8 miles single track to connect North and South Shore lines @ \$30,000 per mile.....	\$ 240,000
Quebec Bridge, single track.....	3,000,000
Chaudiere Junction to Chesuncook, 105 miles @ \$30,000 per mile.....	3,150,000
Chesuncook to Harvey, 137 miles @ \$30,000 per mile...	4,110,000
	<hr/>
	\$10,500,000

## Report on the Line Instrumentally Surveyed.

COLLINGWOOD SCHREIBER, Esq.,

Chief Engineer Government Railways,

&c., &c., &c.

SIR,—Acting on your instructions of the 16th July last, I have made a careful instrumental survey of the line running up the south branch of the Rivière-du-Sud, designated as line No. 2 in the report on the barometrical reconnaissance of July last.

The initial point of the survey is on the line of the Intercolonial Railway, 4 1/2 miles west of Saint Charles Station, and 12 miles east of Chaudière Junction.

An alternative starting point presents itself, which, with a view to accommodate traffic between Quebec and Levis, might leave the Intercolonial Railway immediately east of St. Charles Station, instead of 4 miles west of it. Trains could thus run on either the main line to Chaudière or the branch to Levis. The eastern connection lengthens the line about one mile, but saves 3 miles of construction.

From the first named point, the line runs nearly east 14.22 miles, to a point near the Village of St. Raphael, there attaining an elevation of 257 feet above the initial point. Near the 15th mile, the line crosses the Rivière-du-Sud, a shallow stream full of boulders, which would require a bridge, with two spans of 100 feet each, at an elevation of 75 feet above the waterlevel. The work would be light on this length, the gradients easy and the curves of large radius. The earth is generally a sandy loam interspersed with boulders, little if any solid rock being apparent.

From the above crossing, the line of survey follows the course of the Rivière-du-Sud to the 27th mile, at which point it turns abruptly to the south, up the Valley of the Rivière-aux-Pins, following that river to its source, where the height of land on the south side of the St. Lawrence, is passed on the 39th mile, at an elevation of 1459 feet above the initial point. This line, between the 14th and 39th mile, did not prove so satisfactory as was hoped. Following the valleys of the rivers named, and being confined within comparatively narrow limits, by their abrupt banks, the alignment is tortuous and the grades irregular, in some places rising rapidly with the streams, while in others the ground is comparatively level. On ascertaining this fact, a number of cross sections were taken at intervals, extending beyond the south side of the river, a gently rising side hill here gradually ascends to a height of several hundred feet, extending longitudinally, and for the greater part, parallel to the line from the summit, somewhat further than the 14th mile.

Another line (marked in blue on the small scale map) was traced by means of the cross sections taken on the side hill, this gave good results; moderate work, minimum curves of  $4^{\circ}$  (1,432 feet rad.) and no grade exceeding 52.8 feet per mile.

The grades can be reduced to 45 feet per mile, by turning south, up the south-west branch of the Rivière-aux-Pins for about half a mile, crossing the stream and returning down the western bank, by these means gaining the additional distance required for the easier grade. This change would necessitate additional height to the viaduct over the north-west branch of the Rivière-du-Sud, leaving the remaining work practically unchanged, as the sloping ground would admit of any grade down to 40 feet per mile.

The maximum 52.8 grade, shewn on the profile, is 14.87 miles long. From the north-west branch of the Rivière-du-Sud to the foot of the incline, the grade is 39 feet to the mile, with minimum curves of  $4^{\circ}$  (1,482 feet radius), the aggregate length of these grades is 25 miles, and the work will be comparatively easy on the whole distance; three bridges, each about 1,000 feet in length and 70 feet in depth in centre, being the only important structures required.

The adoption of the line, *via* St. Charles Station, would necessitate another trestle bridge, (1,500 feet in length, and 100 feet in depth in the centre), over the River Boyer, near the station; the rest of the work would be of a simple character.

After passing the summit, the line gradually descends south-east-erly to the head waters of the River St. John, with varying gradients, none exceeding 52.8 feet per mile, and minimum curves of  $4^{\circ}$ . The earth-works here will be the heaviest on the division, averaging about 25,000 cubic yards per mile.

The International Boundary is passed on the 58th mile, near the River Daagwaam, a tributary of the Saint John, it is a shallow stream with boulder bed, requiring two spans of 60 feet each, 25 feet above the water level.

From the crossing of the Daagwaam to the South-West branch of the River St. John, the line is straight and the ground practically level. The latter stream is also quite shallow with low banks and a boulder bed. Two spans of 100 feet each, 35 feet above the water level, are required here.

From the St. John the line was run as nearly direct as possible to the discharge at the North end of Yule Lake, between the 78th and 79th mile. This stream will require a bridge of 50 feet span laid 20 feet above the water.

From the discharge, the line was carried to the dam at the foot of Churchill Lake, on the Alleguash River, the terminating point of the survey.

The Alleguash is shallow, with a boulder bed, similar to the Saint John. It will require two spans of 100 feet each, 30 feet above the water.

The entire distance surveyed from the initial point on the International Railway to the River Alleguash is 96-54 miles; this distance is shortened about 4-54 miles by changes in the line, reducing the actual length to 92 miles, or five per cent. longer than an air line between the points.

By inserting a tunnel 3,000 feet in length at Robber street, a mile more can be saved, reducing the distance to 91 miles. This has not been taken into consideration.

The distance from the initial point West, along the Intercolonial Railway, to Chaudiere Junction is 12 miles, making about 104 miles from Chaudiere Junction to the Alleguash River. Of this distance 57-59 miles are in the Province of Quebec and 46-41 miles in the State of Maine; 92 miles will have to be constructed.

The portion of the survey between the Rivers St. John and Alleguash, was not so satisfactory as could have been desired; a summit of 350 feet (ascending East) was found between the rivers, which cannot be overcome on the line surveyed, with grades of 52-8 feet per mile. Two dotted lines are shewn on the small scale map, by either of which these and perhaps easier grades can be obtained. Of these two dotted lines, the one best calculated to reduce the grades is that running South from the River Daagwaam, intersecting the Yule line West of its crossing of the South-West branch of the River St. John, passed at this point approximately at 100 feet higher level than on the line surveyed. The ascent is thus practically modified and the desired grades obtained.

This line would have been surveyed on the return of the party but for the lateness of the season (November). The snow which had already fallen to a depth of fifteen inches, on these high places, was hourly becoming deeper, the party were without snow shoes and were 60 miles from the nearest settlement. Moreover, the "caches" of provisions left at intervals, had been robbed, leaving no alternative but to abandon the woods as quickly as possible, or risk starvation.

In order to avoid the summit mentioned, another line was examined and its height estimated by the barometer; it runs some distance North of the line surveyed, crossing the Saint John River near "Seven Islands." A line generally direct and level can be obtained between the rivers, with a summit not exceeding 40 feet in height. As this survey proved so satisfactory, the Western end of the line was also examined. It was established by spirit level, that the height of land immediately South of the St. Lawrence in the Province of Quebec, could be passed some 8 miles further East, at Lac Boillard, 200 feet lower than on the line surveyed *via* Riviere aux Pins.

This line (*via* Lac Boillard) leaves the North-West branch of the Riviere aux Pins, near the surveyed line, at the 25th mile and the head of the 39 foot grade. It is possible that this grade may be continued all the way to the summit owing to the lower altitude of Lac Boillard summit. The portion between the summit and Seven Islands, a distance of some 30 miles, also descends gently through a country favorable for railway construction.

This Northern line, and the line instrumentally surveyed, measure the same distance respectively (on the accompanying map), from St. Charles Station to a common point on the Mooseluc River, from which point an extension Eastward could be made as readily as from the line surveyed. Owing to the more level character of the

country, which requires much less angular deflection, the distance would be lessened by this line by about 4 miles, while for purposes of heavy freight the lower summits it passes over, will virtually shorten it many miles.

The fact that this line runs for some 20 miles, only a short distance from the International Boundary, would render it more useful to the Province of Quebec than one passing to a greater distance, as it would be the means of opening up several fertile and inaccessible parishes in the Eastern part of the Province, while, owing to its distance from any of the centres of trade in Maine, the Northern part of that State (including the fertile Aroostook Valley) would be made tributary to the Dominion.

#### COMBINATION LINE.

I beg leave to direct attention to line (marked No. 3 on the general map) which was explored as far as the summit and favorably mentioned in my report on the reconnaissance made in July last. Starting from Chaudiere Junction it would traverse the valleys of the Etchemin and Famine Rivers to the height of land near the village of St. Justin,

This summit is 950 feet above the starting point at Chaudiere Junction, or 509 feet lower than the summit on the line surveyed by Riviere du Sud. From St. Justin the line would continue its course South-East and nearly direct to the vicinity of the head of Lake Chesuncook, from whence it would connect with the line surveyed during the past season between that Lake and Canterbury.

From data on hand there is every reason to believe that grades not exceeding 35 to 40 feet to the mile can be easily obtained in both directions, by this route from Chaudière Junction to Canterbury.

This line appears to me to possess advantages peculiar to itself, which I have deemed it my duty to point out in a special report.

#### COST.

I submit an estimate of cost of line by Rivière du Sud, in the appendix No. 1. I am quite satisfied that the cost of the line *via* Etchemin to Chesuncook would be somewhat less in amount, as the country is better, the grades easier and the work lighter. I am unable to make a detailed schedule of quantities for the whole distance, from the data on hand. Of 96 miles of the line surveyed, only 89 miles may be said to be approximately located.

I have taken out the quantities on the 89 miles where an approximate location has been established; these calculations give a full average which may be applied to the whole mileage, and can be accepted with confidence, as representative of the whole work.

Where quantities could not be obtained, as in solid rock, loose rock, and masonry, the same average per mile was taken as was experienced on the Miramichi District of the Intercolonial Railway, which passes over a similar country.

According to this estimate, the cost of the road fully equipped with stations, shops, wood-sheds, water service, &c.; with the exception of rolling stock would be \$24,841 per mile. See Appendix No. 1.

The plans and profiles accompanying the report are given in Appendix No. 2.

The field work done this season, consists of 4 lines barometrically examined, viz:—the direct, the Yule, the Rivière du Sud, and the line by the Seven Islands, including some supplementary examinations considered necessary,—aggregating 573 miles. The lines instrumentally surveyed, including offsets and cross sections amount to 207 miles, making 780 miles in all. (See Appendix No. 3.)

Tables of grades and curves are given in Appendix 4.

It will be seen on examining these tables that 2.05 miles of curves have been put down at 6. As they can be reduced to 4 by a reasonable expenditure of earthwork, I have so rated them in the report.

The part of the line surveyed through the Province of Quebec passes its whole length through the County of Bellechasse.

After leaving St. Charles, it passes near the thriving villages of St. Gervais, St. Rafael, Armagh, Lafayette, St. Paul du Bütón and St. Magloire. The greater part of this distance, even up to the crown of the summit, is under a fair state of cultivation. The land, although in some cases stoney, is generally good and well watered, fit either for grazing purposes or the raising of cereals. After crossing the summit all settlement ceases, although the climate is milder and the lands on the Southern slope are of better quality, well fitted for settlement and covered with forests of fine spruce, intermixed with ridges of large birch, maple, elm and other hard woods, which extend to the International Boundary.

After entering the United States the same description of land and fine timber extends throughout to the River Allagash. Here there are no settlements. The lands are all in the hands of lumberers, who, from an experience of the disastrous fires caused by the farmers, discourage all settlement. These lumbermen import most of their supplies required for the North-Western part of the State from Quebec by St. Jean Port Joli and Seven Islands. The North-Eastern portion comes from St. John, N.B.

A railway constructed on any of the lines here mentioned would pass through the finest timber lands in Maine and would certainly do all the business of this fine country in the way of transport of supplies; and the sawn lumber as well as the squared birch and other hard woods that cannot be floated would be carried either to Quebec or St. John. A demand for such lumber is rapidly increasing as the finer woods, such as walnut and pine are rapidly disappearing. This would have the effect of virtually making the country tributary to the Dominion. See Appendix No. 5.

I cannot conclude without expressing my appreciation of the efficient assistance rendered me in the prosecution of the survey by

my principal assistant, Mr. Edwin Forse, C.E., who has done everything in his power to make the examination a success.

I would also speak of the willing services of the other members of the force Messrs. O'Sullivan, Cunningham, F. Forse, S. Hill, O'Donnell, Guay, Olivier and Perron, who have one and all executed their various tasks with intelligence and zeal, and to my entire satisfaction.

The service was an arduous one, being prosecuted through a country the last 60 miles of which was entirely wild, destitute of roads and other means of transportation, where the barest necessities only were carried by portageurs.

I have the honor to be, Sir,

Your obedient Servant,

(Signed,) A. L. LIGHT,

Chief Engineer Government Railways,

Province of Quebec.

Ottawa, 23rd March, 1885.

## APPENDIX No. 1.

## SHORT LINE RAILWAY.

## QUEBEC TO ALLAGUASH.

ESTIMATE of Line *via* the Rivière du Sud, running South of Yule and Churchill Lakes to the Allaguash River—92 miles.

Quantities.	Description of Work.	Prices.	Amount.
.....	Right of way and damages.....@	\$ . c.	\$ . c.
970	Acres clearing (80 miles)....."	25 00	24,250 00
2,514,000	Cubic yards Embankment .....	0 80	754,200 00
122,176	" " Rock excavation .....	1 50	183,264 00
823,840	" " Loose rock .....	0 50	161,920 00
19,200	Lineal rods fencing (30 miles)....."	1 25	24,000 00
8,000	Cubic yards 1st class Masonry....."	12 00	96,000 00
5,000	" " 2nd " .....	8 00	40,000 00
13,000	" " Culvert .....	5 00	65,000 00
242,880	Sleepers (2 centres)....."	0 20	48,576 00
9,568	Tons Steel rails and fastenings....."	30 00	287,040 00
92	Miles Track laying....."	250 00	23,000 00
276,000	Cub. yds. Ballast (3,000 c. yds. per mile)....."	0 30	82,800 00
700	Lineal feet Steel Bridging....."	60 00	42,000 00
3,000	" " " Trestle .....	40 00	120,000 00
125	M. ft. b. m. Timber in Cattle-guards .....	20 00	2,500 00
9	Passenger and Freight Stations....."	1,500 00	13,500 00
9	Wood Sheds....."	400 00	3,600 00
5	Water Tanks, with pumping Engines....."	3,000 00	15,000 00
1	Engine House with 12 stalls .....	.....	15,000 00
1	Machine Shop and fixtures....."	.....	20,000 00
5	Miles siding....."	7,200 00	36,000 00
			\$2,077,650 00
	Add—Contingencies and Engineering, 10 per cent.....	.....	207,765 00
	Total estimated cost for 1st class road as above.....	.....	\$2,285,415 00
	Average per mile .....	.....	\$24,841 00

## APPENDIX No. 2.

The maps and profiles which accompany this report, consist :—

- 1st.—Of a map and profile on the same sheet, of the whole line, on a scale of 1,000 feet to the inch, horizontal, and 100 feet vertical.
- 2nd.—A Topographical Map of 400 feet to the inch, shewing an approximated location of of 65 miles, and the general character of the country in the immediate vicinity of the line, the rivers, mountains, &c.
- 3rd.—A Profile, on the same horizontal scale of 400 feet to the inch, 20 feet to the inch vertical.
- 4th.—A map and profile of the country between the Rivers St. John and the Allagnash, scale 5,000 feet to the inch horizontal and 100 feet vertical ; shewing the line and profile as surveyed over the intervening summits ; also, two dotted lines where better grades can be obtained ; further shewing the grades that can be obtained east and west of the St. John River, near Seven Islands.
- 5th.—Taché's Map of the Province of Quebec, on a scale of 14 miles to the inch, shewing in general all routes which have been examined.

## APPENDIX NO. 3

## BAROMETRICAL OBSERVATIONS, GENERALLY WITH TWO ANEROIDS.

	Miles.
Direct line, Chaudière Station to Alleguash River.....	100.00
Yule do do do do do	114.00
Rivière-du-Sud, from St. Charles Station do	96.00
Rivière-aux-Pins, <i>via</i> Seven Islands to Mooseluc.....	85.00
Rivière-aux-Pins to St. Magloire and River Daagwaam.....	25.00
From River Daagwaam, across portage, to South-West St. John.	10.00
Daagwaam to St. Justin Summit (spirit levels).....	12.00
St. Magloire to north-west branch of St. John River.....	10.00
From forks of the S. W., up ditto and up South Branch of St. John.....	25.00
From Dam at Churchill Lake to Chamberlain Farm.....	25.00
Around South end of Yule Lake.....	7.00
From Churchill Dam to Harveys, foot of Unsaskis Pond.....	18.00
From foot of Unsaskis Pond to Seven Islands.....	14.00
From Seven Islands to Black River Lake.....	10.00
From Seven Islands to St. Pamphile.....	22.00
	<hr/> 573.00

## INSTRUMENTAL SURVEYS.

*Lines chopped, chained and levels taken and checked.*

	Miles.
From 4 miles west St. Charles Station to Alleguash River.....	96.54
Offsets on do do do do do { .....	46.00
Cross Sections do do do do { .....	15.00
From Summit, <i>via</i> Long Lake, to Robber Street.....	12.00
From do to Lac Boillard and two intermediate summits.....	25.00
From do on west side of Rivière-du-Sud, north to St. Raphael, including offsets and sections.....	12.40
	<hr/> 206.94
Total number of miles surveyed, examined and checked.....	779.94
Number of miles of levels checked.....	122.76

IDS.  
Miles.  
00.00  
14.00  
96.00  
85.00  
25.00  
10.00  
12.00  
10.00  
25.00  
25.00  
7.00  
18.00  
14.00  
10.00  
22.00  
73.00

Miles.  
96.54  
46.00  
15.00  
12.00  
25.00  
2.40  
6.94  
9.94  
2.76

#### APPENDIX No. 4

#### SHORT LINE RAILWAY.

QUEBEC TO ALLAGUASH—92 Miles.

STATEMENT OF GRADES PROPOSED.—From 0 to 65th MILE.

Distance. Miles.	ASCENDING EASTERLY.						ASCENDING WESTERLY.											
	Rate per 100 feet.						Rate per 100 feet.											
10	.20	.30	.40	.50	.60	.70	.80	.90	.10	.20	.30	.40	.50	.60	.70	.80	.90	
20	.30	.40	.50	.60	.70	.80	.90	1.00	.20	.30	.40	.50	.60	.70	.80	.90	1.00	
0 to 10	1.21	0.68	0.49	0.57	0.57	0.49	0.49	0.49	4.15	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	
10 to 20	0.25	0.72	0.28	0.57	0.28	0.57	0.57	0.57	4.85	5.15	5.15	5.15	5.15	5.15	5.15	5.15	5.15	
20 to 30	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	9.20	9.20	9.20	9.20	9.20	9.20	9.20	9.20	9.20	
30 to 40	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	
40 to 50	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	
50 to 60	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	
60 to 65	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	
8.33	0.72	0.68	0.75	0.91	1.25	0.49	10.45	.....	22.22	0.28	0.38	0.95	0.38	0.38	0.38	0.38	0.38	

Of the remaining distance to the Allaguash, 28 miles, probably one-half will require a maximum grade of 1.00 per 100, but this maximum will probably not be required at any one place, for a greater distance than 5 miles.

## APPENDIX No. 4.—Continued.

## SHORT LINE RAILWAY.

## QUEBEC TO ALLAGUASH.

STATEMENT SHEWING APPROXIMATE ALIGNMENTS.—From 0 to 65th mile.

From—To	Tangents.	CURVES.					Total Miles.
		2°	3°	4°	5°	6°	
		Rad. 2865'	Rad. 1910'	Rad. 1432'	Rad. 1146'	Rad. 955'	
Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.
0 to 10	9.23	0.77	.....	.....	.....	.....	10.00
10 to 20	6.82	0.51	1.61	0.38	.....	0.68	10.00
20 to 30	6.83	0.55	1.36	1.06	.....	0.20	10.00
30 to 40	8.06	.....	1.60	.....	.....	0.34	10.00
40 to 50	7.04	0.25	1.34	0.54	.....	0.83	10.00
50 to 60	7.87	1.13	1.00	.....	.....	.....	10.00
60 to 65	5.00	.....	.....	.....	.....	.....	5.00
		50.85	8.21	6.91	1.98	.....	2.05
							65.00

NOTE.—Total curvature—22 per cent of whole distance.

Of the remaining distance to the Allagash 28 miles.

The curvature will not exceed above average.

## APPENDIX No. 5.

Either of the lines crossing the Saint John River and its branches would open extensive sources of industry to the inhabitants of the valley of the Saint Lawrence, as they will give a ready means of access to the sea for manufactured wood of all kinds.

The head waters of the Saint John and other rivers which take their rise on the range of hills lying South of the Saint Lawrence, pass not only through lands covered with a growth of hard wood, but also through or adjacent to large tracts of black spruce which cannot be successfully utilized at present owing to the distance which the logs have to be driven before reaching the sea, as well as to the time required for the same; much of this timber being unable to reach the sea until the expiration of two years, and at a cost of men, driving, booming, etc., of \$2 per M.F.B.M. There is also a considerable quantity of pine left by the timber makers, as well as an enormous quantity of cedar, which railway communication will render available.

Should either of these lines be built, mills will immediately be erected on the various streams which will be crossed, and the lumber when sawn will be delivered at much cheaper rates, as well as within less than half the time, at the seaboard on the St. Lawrence by rail, than it can now be done by rivers. Hay, oats, provisions and supplies as well as river drivers and laborers for the woods can also be carried at so much cheaper rate than at present from the St. Lawrence, as will reduce the cost of producing deals at least two dollars per M.F.B.M.





# MAP

Compiled from EUGENE TACHE'S Map of the Province of Quebec.

## SHEWING SEVERAL PROPOSED LINES FOR THE

# SHORT LINE RAILWAY

## Between MONTREAL and the Cities of ST. JOHN and HALIFAX,

Via QUEBEC and CHESUNCOOK and

—————Via MEGANTIC and METTAWAMINK—————

## WITH SPECIAL REFERENCE TO A

# Combination Line.



nce of Quebec.

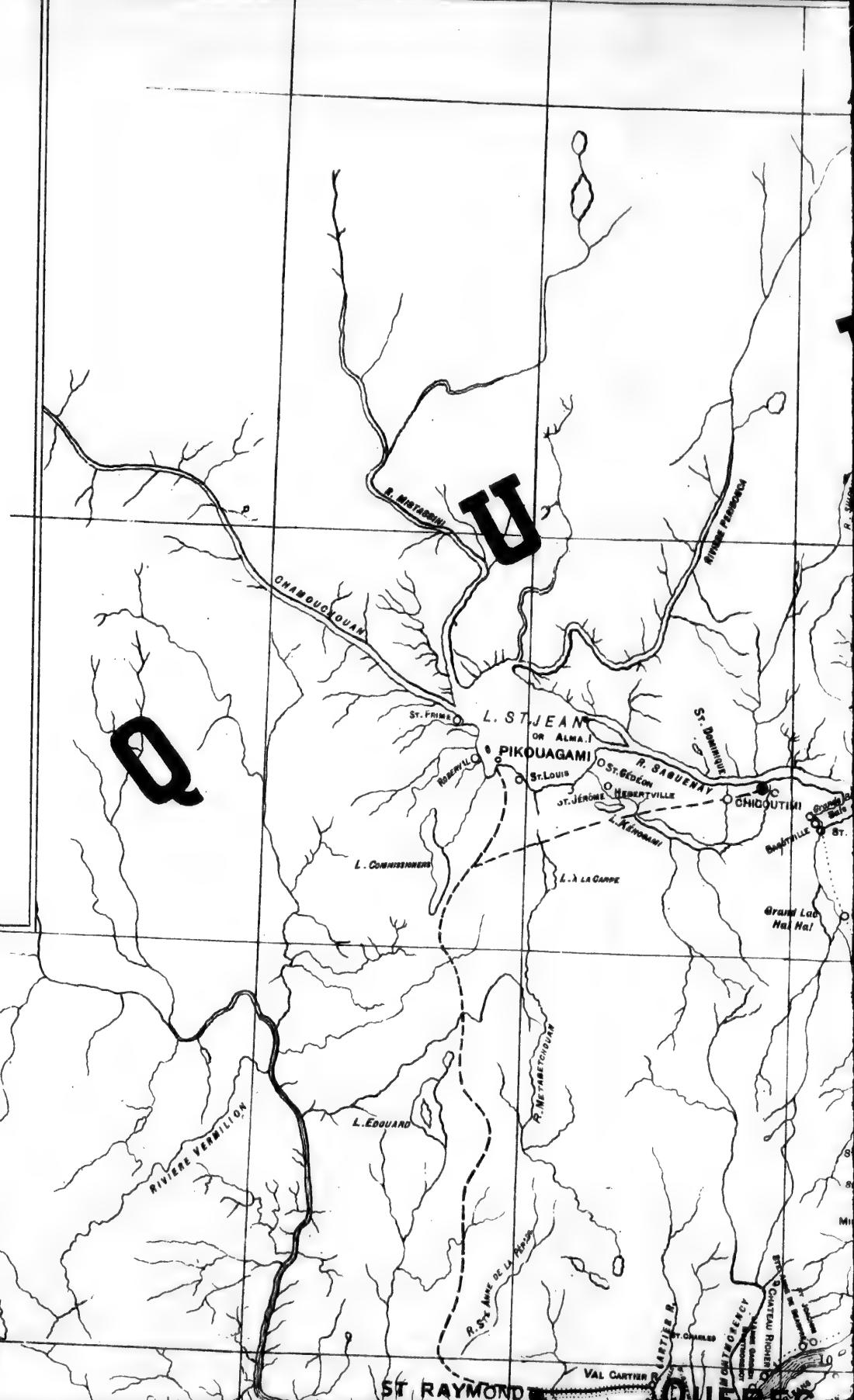
LWAY

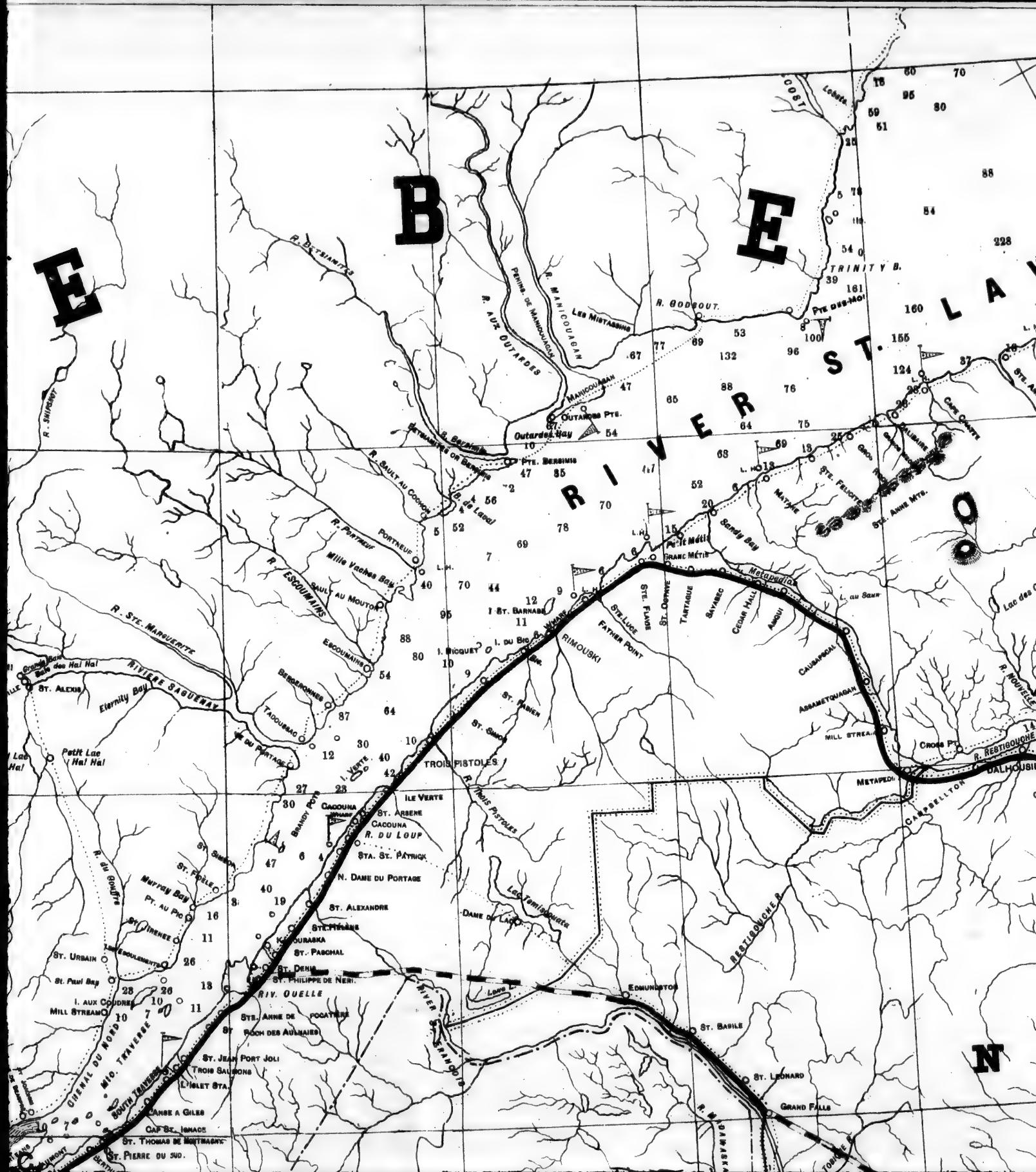
HALIFAX,

TTAWAMKEAG,

line.

L. MONG.  
R. MENOMANGOO  
L. MENJOMANGOO  
L. PISOATON  
L. BICATORONGUE









SCATONGUS

6

